ANSI/EIA-364-71B-2000
Approved: December 20, 2000

EIA-364-71B

EIA STANDARD

TP-71B

Solder Wicking (Wave Solder Technique) Test Procedure for Electrical Connectors and Sockets

EIA-364-71B

(Revision of EIA-364-71A)

JANUARY 2001

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(From Standards Proposal Number 4872, formulated under the cognizance of the CE-2.0 National Connector Standards Committee.)

Published by

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Technology Strategy & Standards Department
2500 Wilson Boulevard
Arlington, VA 22201

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TEST PROCEDURE No. 71B

SOLDER WICKING (WAVE SOLDER TECHNIQUE) TEST PROCEDURE
FOR
ELECTRICAL CONNECTORS AND SOCKETS

(From EIA Standards Proposal No. 4872, formulated under the cognizance EIA CE-2.0 Committee on National Connector Standards, and previously published in EIA 364 as TP-71A)

1 Introduction

1.1 Scope

This standard applies to connectors and sockets that are mounted to printed wiring boards (PWB) employing through mount technology.

1.2 Object

The purpose of this test is to determine whether a specimen can be wave soldered to a printed wiring board without sustaining damage caused by solder wicking onto the contact surfaces or other areas that might alter its operating characteristics.

1.3 Reference documents

1.3.1 Joint Industry Standard, EIA/IPC J-STD-004, "Requirements for Soldering Fluxes", January 1995, Amended 1 April 1996. An ANSI National Standard, developed by the Flux Specifications Task Group of the Institute for Interconnecting and Packaging Electronic Circuits (IPC).

1.3.2 Joint Industry Standard, EIA/IPC J-STD-006, "Requirements for Electronic Grade Solder Alloys and Fluxed and Non-Fluxed Solid Solders for Electronic Soldering Applications" January 1995, Amended 1 July 1996. An ANSI National Standard, developed by the Solder Alloy Task Group(5-22g) of the Institute for Interconnecting and Packaging Electronic Circuits (IPC).

2 Test resources

2.1 Equipment

2.1.1 Wave solder machine capable of providing all the wave variables listed in clause 4.

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2.1.2 The microscope or magnifier device that is used for final inspection of the specimen will be capable of 10X magnification.

2.2 Material

2.2.1 The PWB shall be NEMA grade G10 or FR-4 glass-epoxy with 2 oz copper on each side, 1.6 mm (0.062 in) thick. The terminal holes in the PWB shall have a diameter size such that the clearance between them and the inserted connector (or socket) terminals shall not exceed 0.38 mm (0.015 in). The terminal holes shall be plated through in accordance with MIL-P-55110 unless otherwise specified.

2.2.2 The solder alloy shall be 63Sn/37Pb or 60Sn/40Pb and be similar to the composition found in EIA/IPC J-STD-006; see 1.3.2.

2.2.3 If a soldering fluid is added to the solder bath to lower the surface tension of the solder bath, then the soldering fluid used shall be either water-based or petroleum-based.

2.2.4 The flux used shall be an activated, warm flux of type ROM0 (previous designation RMA) flux as found in EIA/IPC J-STD-004; see 1.3.1.

3 Test specimen

3.1 Description

A test specimen shall consist of a connector or a socket.

3.2 Preparation

3.2.1 The specimen shall be mounted on the PWB with terminals inserted in plated-through holes.

3.2.2 Right angle connectors shall have their mating areas or surfaces protected to avoid or prevent solder form splashing on to those areas while passing through the wave.

3.2.3 The bottom surface of the PWB shall be bathed in an activated warm flux; see 2.2.4.

4 Test procedure

4.1 Process and parameters of the test

4.1.1 The specimen and the PWB have been prepared as per 3.2.

4.1.2 The solder wave temperature, measured at the top of the wave, shall be maintained at 260 °C ± 5 °C (500 °F ± 9 °F) during the solder process; the solder wave contact length shall be from 2.5 cm to 7.6 cm (1 inch to 3 inches).

4.1.3 By a conveyor belt or other suitable means the PWB with its mounted specimen is passed uniformly through a pre-heat zone (such as between electric heaters or globar sources) and then continues moving through the wave solder.

4.1.4 When passing through the pre-heat source, the PWB shall have the temperature of its top surface raised uniformly to a minimum of 100 °C ± 5 °C (212 °F ± 9 °F).

4.1.5 The PWB shall traverse the solder wave immersed at a depth of 1/2 to 2/3 of the PWB's thickness and the wave contact length shall be from 2.5 cm to 7.6 cm (1 inch to 3 inches).

4.2 Time of exposure to solder wave

Time duration, in seconds, of exposure to the solder wave shall be calculated as follows:

$$T = D/S$$

where:

T = time, in units of seconds, for a point on the PWB to traverse the wave.
S = speed of PWB travel, in units of distance per second
D = solder wave length, in units of distance that are the same as in S.
(D is defined as the distance a point on the PWB travels within the solder wave)

4.3 Evaluation of results

4.3.1 Visual

At the conclusion of the test, the specimens shall be disassembled and examined under 10X magnification for any solder damage. Solder damage is defined as any solder on the contact mating surface, solder that interferes with the operation of spring pressure mechanisms, or solder that interferes in any way with the intended mating function of the contact.

4.3.2 Mechanical

If the visual examination cannot be made to assess solder wicking, then the connector shall meet the mating and unmating force requirements as specified.

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4.3.3 Validity

For certification of a valid test, the plated through holes shall be filled to a minimum for 75% of the board thickness. If more than 25% of the total holes are not so filled, the test shall be considered invalid and a retest performed.

5 Details to be specified

The following details shall be specified in the referencing document:

5.1 Description of specimens and number to be tested

5.2 Time of exposure to the solder wave

5.3 Special preparations or conditions, if required

5.4 Inside diameter of plated-thru-holes in the printed wiring board

6 Test documentation

Documentation shall contain the details specified in clause 5, with any exceptions, and the following:

6.1 Title of test

6.2 The number of specimen mounted on each printed wiring board

6.3 Type and composition of flux and solder

6.4 Test equipment used, and date of last and next calibration

6.5 Test procedure

6.6 Dimensions of the printed wiring board

6.8 Observations and results

6.9 Name of operator and date of test

ANNEX

A Informative

The test, as defined herein, shall be considered indicative of the connector's design capability to prevent solder wicking. It is important to note that other conditions; e.g. board thickness, flux, etc.; may produce different results. In the instance where these variables may be significantly different from those specified herein, it is recommended that they be substituted for those as specified in the referencing document.

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